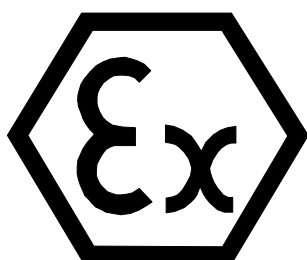


Description

**BDT 2****BDT 3****BDT 4**

EEx i Terminals BDT 2 / BDT 3 / BDT 4

General

The three BDT terminals available range from a simple 8 function Keypad to a 16 function keypad (four fold useable), with full alpha-numeric capability. The devices are appointed with an intelligent modular software system, the PLC mode. This software was developed specifically for a direct and fast communication to a PLC and is distinguished by the following:

- Possibility of direct connection to a variety of PLC systems.
- Uniform operating functions.
- All terminals are programmable with the same PLCPLUS software.

The EEx i terminals are mainly used in plant and process engineering and the chemicals industry.

The BDT displays are multifunctional devices in a compact construction. They were developed particularly for industrial / hazardous area use and facilitate:

- **fault message display and acknowledgement**
- **operator guidance**
- **system status indication**
- **data collection**
- **system control**

System Overview - Hardware

The EExi displays BDT2, BDT3 and BDT4 are designed for use in hazardous areas. The protection method is intrinsically safe.

The display is supplied with a 12V DC intrinsically safe supply by the BSG2 interface. The data communication interface between the hazardous and the non hazardous area is via RS-422. When installing the apparatus you must take note of the conditions for safe use detailed on the certificate of conformity.

- High EMC (Electro-magnetic compatibility)
- Highly legible displays in several dimensions
- Ingress protection IP 65 (frontside)
- Simple installation into switchboards or enclosures
- Electrical connections via screw terminals and subminiature D-connectors
- Communication interface with opto coupler potential isolation
- Remote programming with PC via the communication interface

Terminals

The EExi displays BDT2, BDT3 and BDT4 are designed for use in hazardous areas. The protection method is intrinsically safe.

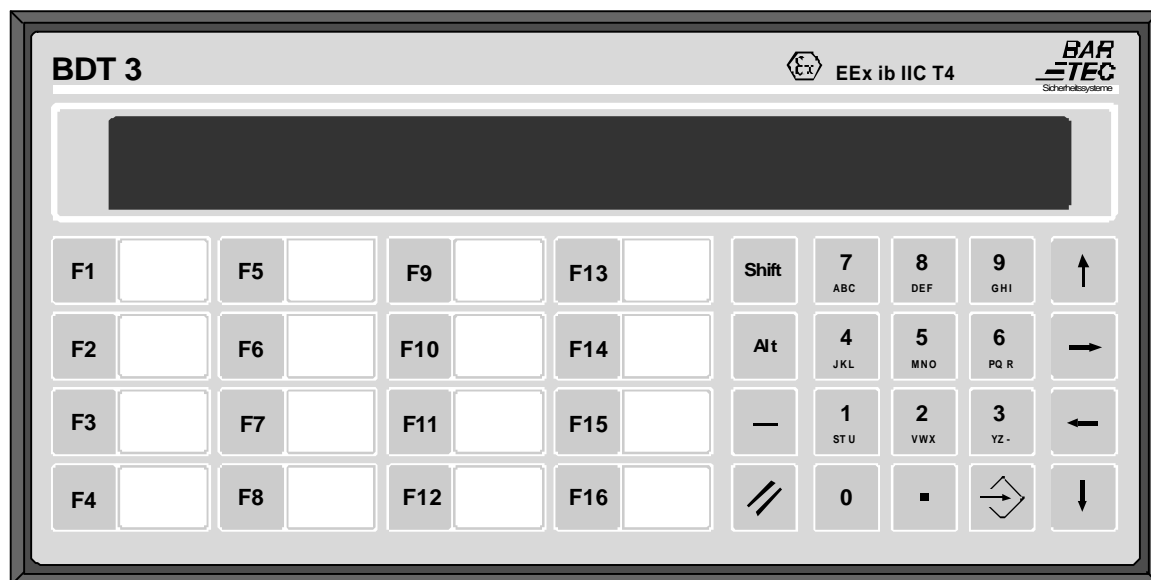
The display is supplied with a 12V DC intrinsically safe supply by the BSG2 interface. The data communication interface between the hazardous and the non hazardous area is via RS-422. When installing the apparatus you must take note of the conditions for safe use detailed on the certificate of conformity.

BDT 2



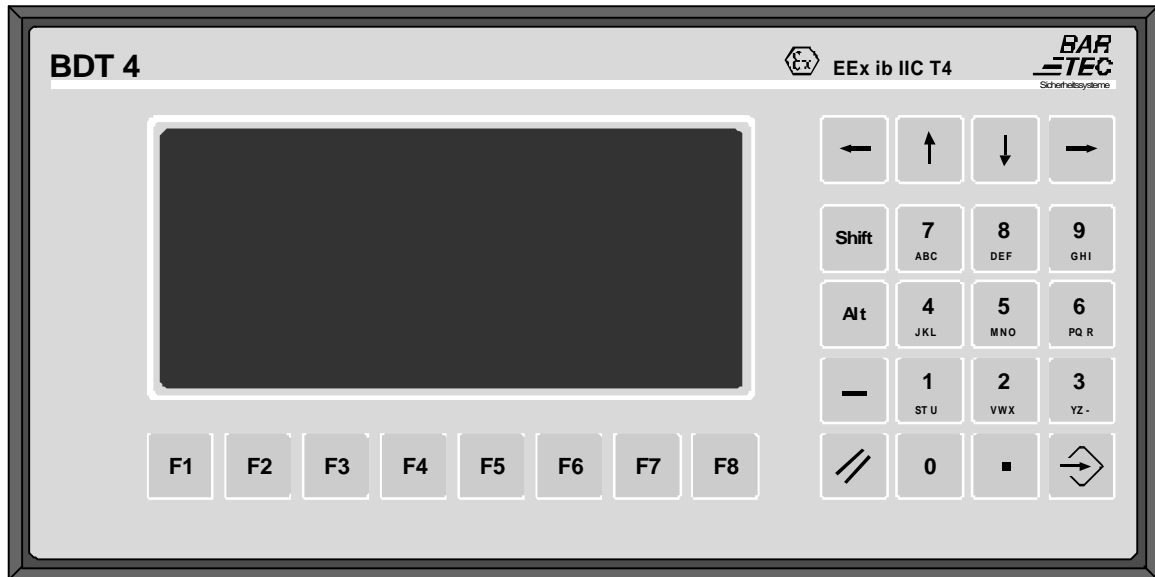
Display	:	LCD, supertwist, 2 x 40 characters, character height 8 mm
Text memory	:	32 KB in EEPROM
Dimensions	:	288 mm x 84 mm x 50 mm (width x height x depth)
Weight	:	1 kg
Interfaces	:	V24; programming interface on BSG 2; TTY; coupling interface for PLC and BSG 2; V24 and TTY changeover; others as external assembly
Keyboard	:	8 function keys

BDT 3



Display	:	LCD, supertwist, 2 x 40 characters, character height 8 mm
Text memory	:	32 KB in EEPROM
Dimensions	:	288 mm x 144 mm x 50 mm (width x height x depth)
Weight	:	1.2 kg
Interfaces	:	V24; programming interface on BSG 2; TTY; coupling interface for PLC and BSG 2; V24 and TTY changeover; others as external assembly
Keyboard	:	16 function keys, quadruple assignment, alphanumeric with cursor keys

BDT 4



Display	:	LCD, supertwist, 4 x 20 characters, character height 12 mm
Text memory	:	32 KB in EEPROM
Dimensions	:	288 mm x 144 mm x 50 mm (width x height x depth)
Weight	:	1.3 kg
Interfaces	:	V24; programming interface on BSG 2; TTY; coupling interface for PLC and BSG 2; V24 and TTY changeover; others as external assembly
Keyboard	:	8 function keys, quadruple assignment, alphanumeric with cursor keys

Technical data

The BDT displays are separated from the power supply and data lines by the BSG 2 interface. The BSG 2 is located in the safe area.

EEx i Terminals

Display	:	LCD supertwist, 80 characters, character height approx. 8 mm (12 mm for BDT 4)
Text memory	:	32 KB in EEPROM, 1000 texts
Front dimensions	:	BDT 2: 288 mm x 72 mm x 50 mm BDT 3/BDT 4: 288 mm x 144 mm x 50 mm
Minimum assembly depth	:	90 mm
Dimension of panel cut-outs.	:	BDT 2: width 275.5 mm tolerance 0.5 mm height 71.5 mm tolerance 0.5 mm BDT 3/BDT 4: width 275.5 mm tolerance 0.5 mm height 131.5 mm tolerance 0.5 mm
Current consumption	:	Max. 160 mA (incl. BSG 2)
Ambient temperature	:	Storage: -25 °C...+70 °C Operating: 0 °C...+50 °C
Cable: terminal to BSG 2 RS 422	:	Type: LiYCY 3 x 2 x 0.75 mm ² , twisted pairs! Length: IIB = max. 1200 m; IIC = max. 210 m
Cable: BSG 2 to PLC V.24 (up to 19200 bd.)	:	Type: eg. LiYCY 2 x 2 x 0.25 mm ² Length: max. 15 m
Cable: BSG 2 to PLC TTY (up to 9600 bd.)	:	Type: eg. LiYCY 2 x 2 x 0.25 mm ² Length: max. 1000 m

BSG 2 power and signal isolation card

Size	:	European standard 100 mm x 160 mm (3HE, 8TE)
Operating voltage	:	Rated: DC 24 V polarized Range: +20.4 V...27.4 V

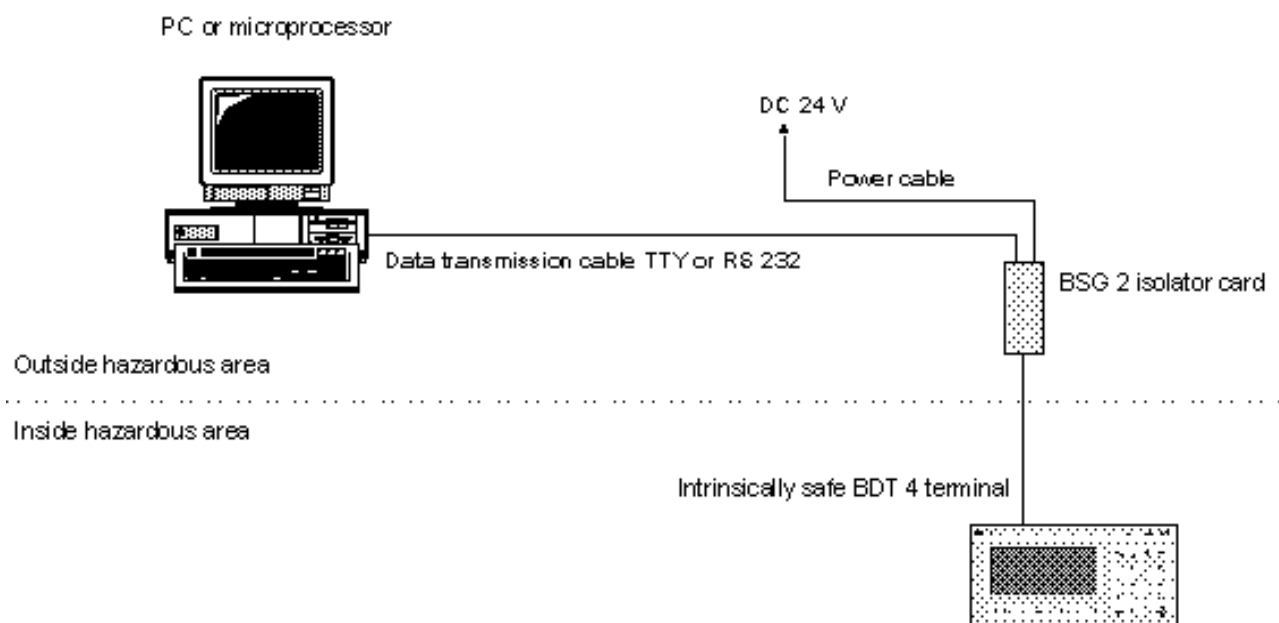
For further technical details see conformity certificates.

Software - General

There are two software options, (the STS mode and the PLC mode), available for these intrinsically safe terminals.

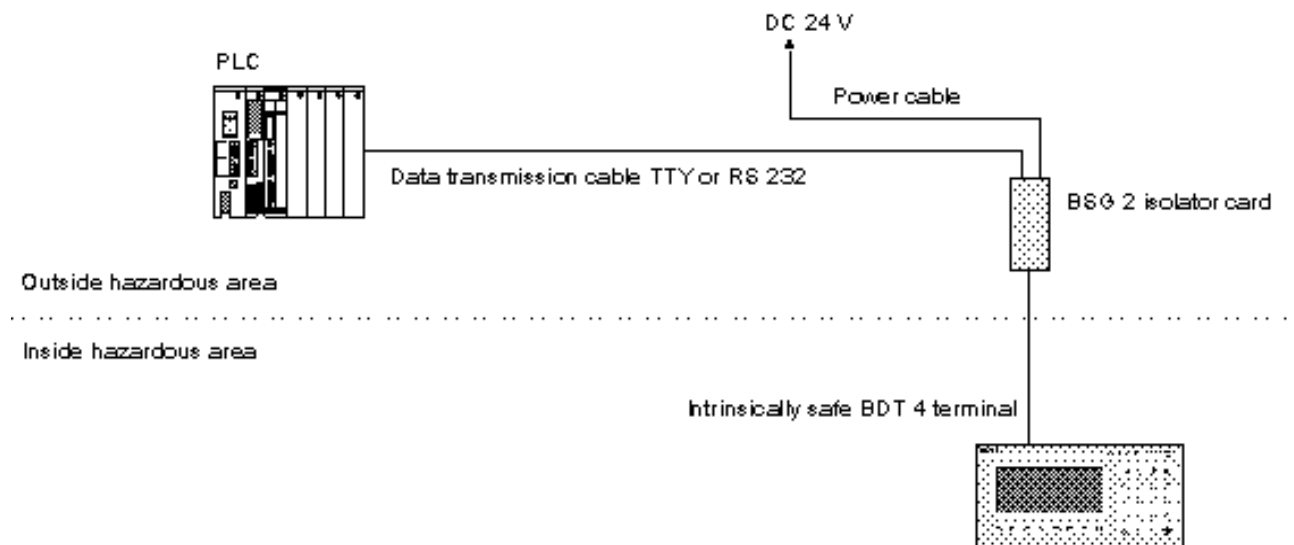
STS mode permits direct connection to computer systems with open ASCII drivers.

Data exchange between computer and terminal is effected by means of ASCII characters and ESC sequences. If more than one terminal is to be connected in a network the UNIP protocol (cf. manual) must be used in the higher-level system.



The PLC mode permits direct connection to the PLC systems of a variety of manufacturers.

The terminal actively acquires data from the PLC (master) or is provided with data by the PLC (slave).



Overview of coupling options

The following table represents an excerpt from the range of couplings established with PLCs made by different manufacturers with various protocols. Please get in touch with us if your PLC and coupling is not included in the list.

Protocol	PLC	Manufacturer	Terminal	Reservations
3964R	S5 95U (second interface) S5 95U/100U with CP521SI Simatic CP524/CP525 115U CPU 944 (second interface) 135U CPU 928b (second interface)	SIEMENS	Master	Communication processors necessary for some
Siemens-PG	S5 90U S5 95U S5 100U (CPU 102 & 103) S5 115U (CPU 941..944) S5 135U (CPU 928a, 928b)	SIEMENS	Master	none
L1-Bus	all Siemens L1 bus compatible S5	SIEMENS	Master	none
3964R		BOSCH	Master	Communication processor necessary
3964R	Teleperm M	SIEMENS	Slave	Communication processor necessary, max. 256 DW
MODBUS RTU	AEG Modicon 984	AEG	Master	none
MODBUS RTU	Series 90-30	GE-FANUC	Master	Communication co-processor CMM311E
MODBUS RTU		HIMA	Master	none
MODBUS RTU		TELEMECHANIQUE	Master	none
MODBUS RTU		HONEYWELL	Master	Register 4096...8192
Mitsubishi	Series FX/FX0, A series	MITSUBISHI	Master	For A series communication chip AJ71C24
COMLI	SattControl 05-30	SATTCONTROL	Master	none
COMLI	SattControl 05-30	SATTCONTROL	Slave	Max. 300 registers
		ALLEN BRADLEY	Master	
HOSTLINK		OMRON	Master	

PLC mode configuration software

The terminals are fitted with intelligent, modular PLC mode software which is specially designed for fast, direct communication with a PLC and possesses the following features:

- Up to 999 message texts can be programmed and called up in the form of messages, display masks or menus. In addition to this there is a freely programmable basic mask
- Each text can be linked to up to 15 freely definable variables
- Doubleword processing optionally from 1.. 10 digits plus fixed decimal point
- The EEx i terminal actively takes the values of the variables from the PLC and converts them to the proper format. Readout and editing of the variables is done by declaration of the PLC address and required display format

Menu-prompted display of setpoint value input with automatic conversion of values:

Decimal prefixed by sign	<->	binary (16 bit and 32 bit)
Decimal unprefixd by sign	<->	binary
Hexadecimal	<->	binary
Bits	<->	binary
ASCII		
Fixed decimal point		

- Specially for SIMATIC S5: timer and counter
- Function keys are treated as digital inputs
- Texts are saved in EEPROM
- History report function
- Real-time clock can be called up from PLC with synchronization between PLC and BDT
- Convenient programming by PC
- Easy handling of fault bits

Coupling with Siemens S5 PLCs

Coupling at PG interface

The following Simatic S5 systems are supported:

- S5 90U
- S5 95U
- S5 100U CPU types 102 and 103
- S5 115U CPU types 941, 942, 943 and 944
- S5 135U CPU 928a, 928b.

Note: This link is not suitable for fast events (reaction time < 500 ms). No further settings need be made on the S5 for connection to the terminal.

Coupling with procedure 3964R

This fast coupling is supported by the following Simatic S5 systems:

- S5 95U for second interface 3964R with data handling block BARTEC CPU RK512
- S5 95U/100U with CP521SI with data handling block BARTEC CP521
- Simatic CP524/CP525 (and CP525 compatible modules)
- 115U CPU 944 second interface 3964R with data handling block BARTEC CPU RK512
- 135U CPU 928b second interface (3964R/RK512)

Coupling with L1 bus of Simatic S5

The L1 bus permits coupling with a maximum of 16 users. Limits are imposed on the number of terminals operating simultaneously from the bus by the low 9600 baud data transfer rate; we recommend a maximum of four terminals to a controller. BARTEC offer a convenient coupling for all Simatic S5 controllers whose PC interface module can be slaved to Sinec L1. Cycle times are approx. 150 ms per connected terminal. Interface protocol is adapted simply by parametrization of two convenient data handling blocks in the Simatic S5. This results in a special data structure, a result of which is that **only BARTEC BDTs may be coupled with the SINEC L1 bus of a Simatic S5**. Bus terminal BT777 of the Siemens interface module is coupled to a BSG 2 isolation card in each case.

Coupling to Teleperm M using procedure 3964R

The PLC mode Teleperm M with procedure 3964R. Coupling to Siemens interface module. Coupling is effected via interface modules 6DS1318 or 6DS1333 (6DS1318 can only be operated actively/passively with TTY).

The IM is not able to offer access to the registers to the terminals. Accordingly, the data must be actively transmitted by the IM. For this purpose 256 data words (16 bits) are available as variable memory.

Coupling to Bosch PLCs using procedure 3964R

Coupling is by means of interface modules (communication processors) with Siemens procedure 3964R.

Coupling to Mitsubishi PLC series MELSEC FX/FX0 and A series

The display operates as a master, actively fetching variables from the PLC memory, converting them to the desired format and displaying them or writing them back.

Memory addresses must be given as follows:

XXXX
ÄÄÄÄÄÄ Four position address eg. data register 1 = 0001

Communication module AJ71C24 is used with the A series.

Coupling with MODBUS RTU protocol

The PLC must be set as slave and accord with the MODBUS RTU protocol function codes. The "MODBUS RTU protocol" described in the "Modicon MODBUS Protocol Reference Guide" serves as the communication protocol. The function codes can be influenced by the address, ie. the number of the memory type used as a prefix.

The EExi terminal is the master and actively fetches data from the PLC. No transmission requests must be programmed there for this interface.

Coupling to AEG Modicon 984 with MODBUS RTU protocol

The "MODBUS RTU protocol" described in the "Modicon MODBUS Protocol Reference Guide" serves as the communication protocol. Interface parameters are resettable.

Coupling to GE-FANUC with MODBUS RTU protocol

Coupling to a series 90-30 GE-FANUC controller is possible with communication co-processor CMM311E.

Coupling to Honeywell PLCs with MODBUS RTU protocol

Access to all registers with address 4°4096...4°8192 ("4" prefix). Flags cannot be influenced.

Coupling to Telemecanique PLCs with MODBUS RTU protocol

The "MODBUS RTU protocol" described in the "Modicon MODBUS Protocol Reference Guide" serves as the communication protocol. Interface parameters are resettable.

Coupling to HIMA PLCs with MODBUS RTU protocol

The "MODBUS RTU protocol" described in the "Modicon MODBUS Protocol Reference Guide" serves as the communication protocol. Interface parameters are resettable.

Coupling with COMLI protocol (master)

The display operates as a master, actively fetching variables from the PLC memory, converting them to the desired format and displaying them or writing them back.

Memory addresses must be given as follows:

XXXX
ÄÄÄÄÄÄ Four position address eg. data register 1 = 0001

Coupling with COMLI protocol (slave)

As the terminal is slaved in this mode, the PLC as master has to fetch out and write registers via COMLI messages. The data transmitted to the terminal by the PLC master is converted in the terminal from binary to text format and displayed.

300 variable registers are available.

The PLC must transmit the following messages for the coupling data:

- Call up register data (type = 2) of "PLC address function key field" (15 registers).
This message must be transmitted constantly in order to interrogate the terminal.
- Transmission of register data (type = 0) of "PLC address control words" (30 registers).
This message can be sent spontaneously by the PLC.
- The variables can now be transmitted and requested spontaneously.

- Important:**
- In order to avoid loss of data, any change to the function key field in the terminal must be made only once and followed by a read message from the PLC.
 - The PLC itself must fetch out this value. The terminal will wait for this to be done.

Coupling to SattControl 05-30

Connect to the RS232 interface. Each terminal must be assigned its own substation number (1...32).

PLC configuration program

The BDT takes information from the PLC and also deposits information there. The entire range of communication can be divided into four blocks. In order to afford maximum variability, the addresses are freely configurable via the PC program PLCPLUS.

- PLC function key field address.
- PLC control words address.
- PLC message register address
- Variables from any areas of the data blocks (registers).

In the case of the Simatic S5 addresses are given by stating the data block (DB 002..DB 255) and data word (DW 000..DW 255). In the case of PLCs supplied by other manufacturers they are given by stating the register number.

Up to 15 edit directed setpoint/actual values can be displayed and edited in a wide variety of formats. The variables are programmed directly into the text in which they are to be displayed. The BDT then actively fetches the values for the variables from the controller memory, converts them to the desired format and inserts them in the text of the display. Text is programmed with an IBM compatible PC using the PLCPLUS software package. Calling up texts controls the functioning of the BDT. All programmed texts are stored in an EEPROM in the terminal.

The number of a text must be entered once only at the PLC message register address.

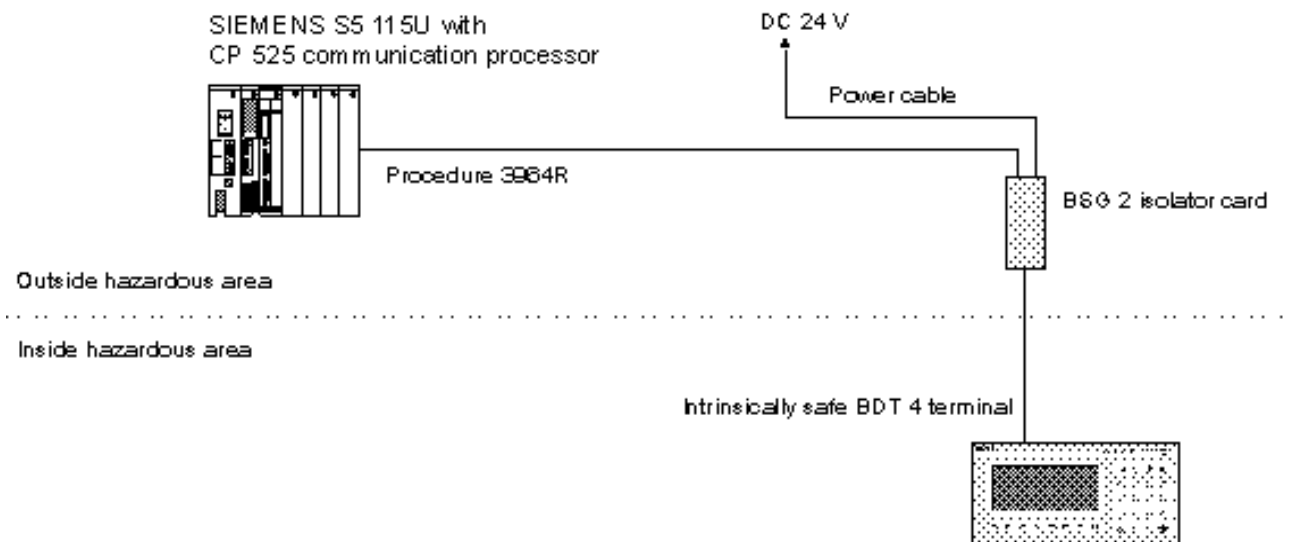
Fault bit processing enables fault and status messages to be represented very conveniently. The maximum number of faults is 240, ie. 15 data words or registers are available. Of these 240 fault messages, a maximum of 32 can be active simultaneously. Representation can take the form of new values, first-up values or sorted by priority.

PLCPLUS user Interface:

The shell of this program complies with SAA specifications. It is convenient to use a mouse or trackball but the keyboard option is also open with no limitations.

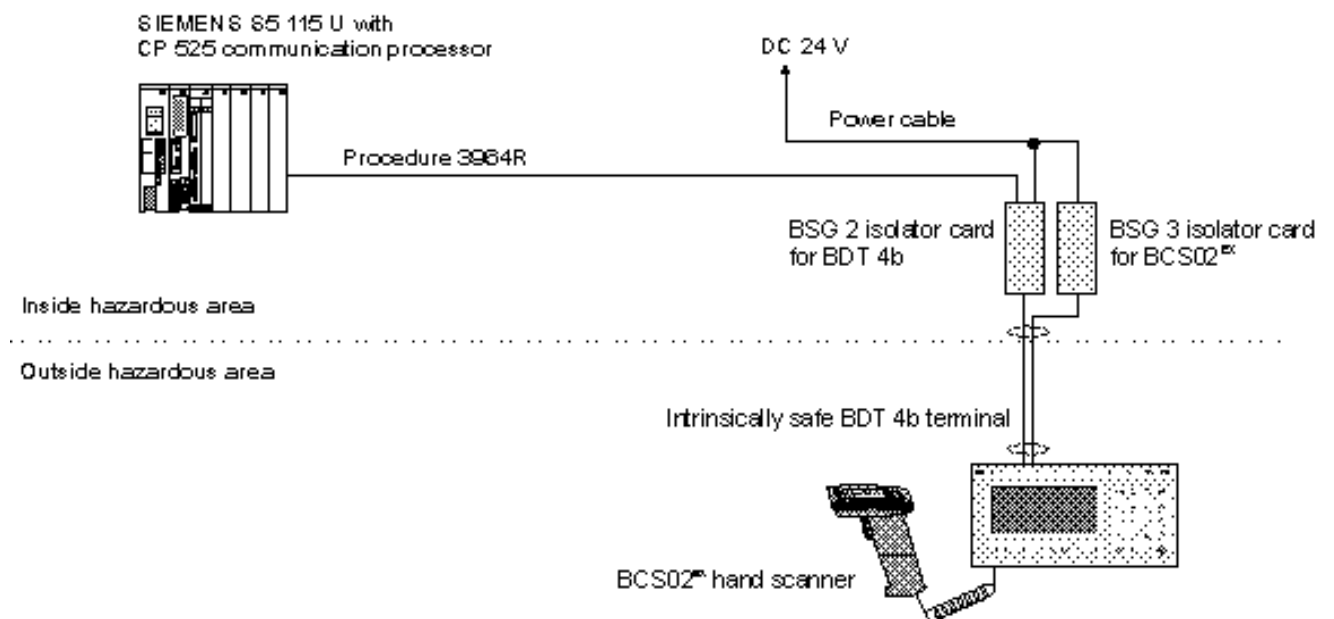
Examples of couplings

Coupling to a Siemens S5 with procedure 3964R:



Examples of couplings

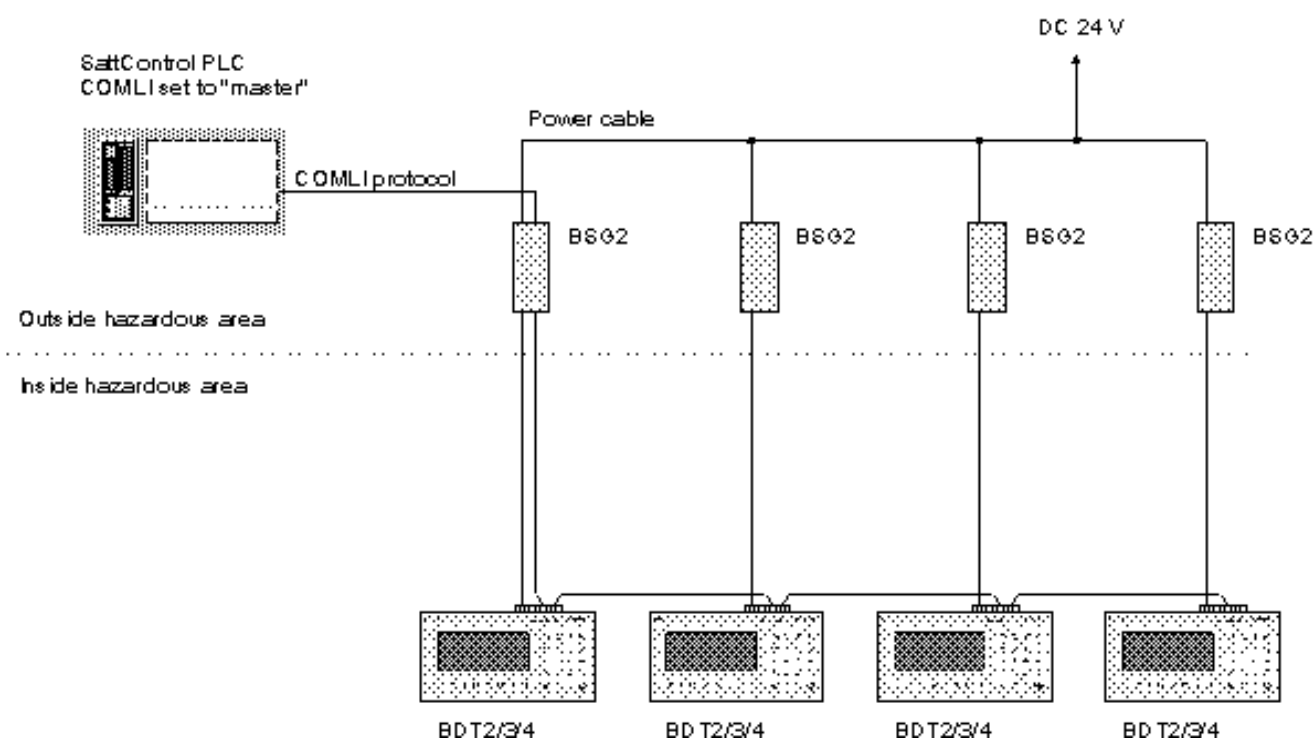
Coupling to a PLC with barcode scanner



Scanned barcodes are interpreted in the same way as manual inputs and read into input fields. Illegible barcodes can be entered manually. They are then automatically transmitted to the PLC.

Examples of couplings

Coupling more than one terminal to a PLC using the COMLI slave protocol



Each terminal is assigned a substation number. The function keys and input fields are cyclically interrogated, one after the other, by the PLC. Variables are transmitted to the individual substations, as and when required.